CLAIMS

What is claimed is:

1. An interchangeable optical mount, comprising:

a base attachable to an optical stage, said base comprising a primary, a secondary and a tertiary datum;

a plurality of forward plates, wherein each of said forward plates comprise a front surface, a rear surface and a fixed number of rear surface structures adapted to communicate with said primary, secondary and tertiary datums;

means for removably joining any one of said forward plates and said base, wherein said rear surface structures are simultaneously brought into contact with said primary, secondary and tertiary datums; and

means for adjusting the height of any of said rear surface structures thereby adjusting and fixing the position and orientation of said front surface in six degrees of freedom.

2. The interchangeable optical mount of claim 1, wherein said base further comprises a rectilinear recess having three orthogonal plane surfaces.

3. The interchangeable optical mount of claim 2, wherein each of said three orthogonal plane surfaces further comprise one or more hardened inserts.

4. The interchangeable optical mount of claim 3, wherein said hardened inserts are all mounted flush to each of said orthogonal plane surfaces.

5. The interchangeable optical mount of claim 4, wherein first, second and third hardened inserts are disposed on a first plane surface adjacent to three of four corners, wherein a first axis passes through a center of each of said first and second hardened inserts and a second axis passes through a center of each of said second and third hardened inserts, and wherein said first and said second axes intersect at a right angle and are respectively parallel to said second and third orthogonal plane surfaces, said first, second and third hardened inserts collectively forming said primary datum.

6. The interchangeable optical mount of claim 5, wherein fourth and fifth hardened inserts are spaced apart and disposed on said second plane surface coaxial with a line parallel to one of said first or second orthogonal axes, said fourth and fifth hardened inserts collectively forming said secondary datum.

7. The interchangeable optical mount of claim 6, wherein a sixth hardened insert is disposed on said third orthogonal plane surface at a point adjacent to the intersection of said first and second orthogonal axes, said sixth hardened insert defining said tertiary datum.

8. The interchangeable optical mount of claim 7, wherein said hardened inserts are further disposed wherein a first virtual plane normal to said secondary datum and passing through said first and second hardened inserts also passes through said sixth hardened insert, and wherein a second virtual plane normal to said tertiary datum and passing through said second and third hardened inserts also passes through said fifth hardened insert.

9. The interchangeable optical mount of claim 1, wherein each of said rear surface structures comprise a threaded contact pad.

10. The interchangeable optical mount of claim 9, wherein said means for adjusting a height of each of said rear surface structures comprises adding or removing one or more shim washers between said threaded contact pad and said rear surface.

11. The interchangeable optical mount of claim 9, wherein each of said threaded contact pads comprises a hemispherical contact end.

12. The interchangeable optical mount of claim 8, wherein an optical element is fixedly mounted about flush to said front surface, said optical element having a normal axis collinear with a line of intersection between said first and said second virtual planes.

13. An instrument mount, comprising:

a rear plate, comprising:

a recess;

first, second, and third orthogonal plane surfaces within said recess;

hardened inserts distributed between and mounted flush on each of said first, second, and third orthogonal plane surfaces, wherein first, second and third hardened inserts are disposed on said first plane surface to form a primary datum, wherein fourth and fifth hardened inserts are disposed on said second plane surface to form a secondary datum, and wherein a sixth hardened inserts is disposed on said third surface to form a tertiary datum;

a front plate, comprising:

a front surface;

a rear surface bossed portion adapted to engage said recess, wherein said bossed portion includes six contact pads distributed between each of three mutually perpendicular surfaces wherein each of said contact pads is disposed at a location on said bossed portion adjacent to a corresponding hardened insert; and

means for removably securing said front plate against said rear plate, wherein three of said contact pads contact said primary datum, two of said contact pads contact said secondary datum, and said one remaining contact pad contacts said tertiary datum, said six contact pads providing six degrees of freedom in adjusting said front surface position and orientation with respect to said primary, said secondary and said tertiary datums.

14. The instrument mount of claim 13, wherein said first, second and third hardened inserts are disposed on said first plane surface adjacent to three of four corners, wherein a first axis passes through a center of each of said first and second hardened inserts and a second axis passes through a center of each of said second and third hardened inserts, and wherein said first and said second axes intersect at a right angle and are respectively parallel to said second and third orthogonal plane surfaces.

15. The instrument mount of claim 14, wherein fourth and fifth hardened inserts are disposed spaced apart and coaxial with a line parallel to one of said first or second orthogonal axes.

16. The instrument mount of claim 15, wherein said sixth hardened insert is disposed at a point adjacent to the intersection of said first and second orthogonal axes.

17. The instrument mount of claim 16, wherein a first virtual plane normal to said secondary datum and passing through said first and second hardened inserts also passes through said sixth hardened insert, and wherein a second virtual plane normal to said tertiary datum and passing through said second and third hardened inserts also passes through said fifth hardened insert.

18. The instrument mount of claim 13, wherein each of said rear surface structures comprise a threaded contact pad.

19. The instrument mount of claim 18, wherein said means for adjusting a height of each of said rear surface structures comprises adding or removing one or more shim washers between said threaded contact pad and said rear surface.

20. The instrument mount of claim 18, wherein each of said threaded contact pads comprises a hemispherical contact end.

21. The instrument mount of claim 17, wherein an optical element is fixedly mounted about flush to said front surface, said optical element having a normal axis collinear with a line of intersection between said first and said second virtual planes.

22. An adaptive optics system comprising:

a two-piece optical mount, said optical mount comprising:

a front plate having a front surface;

an micro-mirror array fixedly mounted to said front surface;

means for adjusting the position and orientation of said micro-mirror array with six degrees of freedom,

a rear plate attachable to an xyz translation stage;

means for removably securing said front plate against said rear plate, wherein said front plate is repeated removable and replaceable.

23. A method for interchangeably mounting an optical element, comprising the steps of:

providing a base master tool comprising orthogonal primary, secondary and tertiary datums;

mounting said base master tool on a traveling microscope to provide a tool assembly and aligning said base master tool to said traveling microscope first and second optical axes;

providing a first backplate adapted to be held by said base master tool, said first backplate comprising a first front surface, and means for positioning and orienting said first front surface in six degrees of freedom, said means for position and orienting locating said first front surface at a first nominal position and orientation with respect to said orthogonal primary, secondary and tertiary datums;

fixedly installing a reticle onto said first front surface and aligning said reticle with respect to said first and second optical axes to provide a first optical assembly;

mounting said first optical assembly onto said base master tool;

aligning said reticle with respect to said first and second optical axes;

providing an optical bench and a laser mounted on said optical bench;

establishing first and second ends of an optical axis with a light beam emanating from said laser, said first end defined by a distal first target aperture and said second end defined by a proximal second target aperture;

installing said first optical assembly onto said optical bench, wherein said first front surface is located behind and facing said first end;

removing said second target aperture and installing a digital camera opposite said first optical assembly and behind said second end, wherein said digital camera is about coaxial with said normal axis;

bringing said first target aperture into focus in said digital camera focal plane;

removing said first target aperture and re-positioning said first optical assembly in order to bring said reticle into focus within said digital camera focal plane;

removing said digital camera and re-orienting said first optical assembly until said laser light beam is reflected off said reticle and back upon itself;

removing and mounting said first optical assembly onto an interferometry system;

adjusting a position of said first optical assembly until said reticle normal axis is coaxial to said interferometry system;

providing a second backplate adapted to be held by said base master tool, said second backplate comprising a second front surface, and means for positioning and orienting said second front surface in six degrees of freedom, said means for position and orienting locating said second front surface at a second nominal position and orientation with respect to said orthogonal primary, secondary and tertiary datums;

mounting an optical element onto said second front surface to provide a second optical assembly;

replacing said first optical assembly with said second optical assembly;

inspecting said optical element in said interferometry system and adjusting said means for positioning and orienting said second backplate, wherein said step of adjusting rotates said second front surface about axes describing said second surface until said optical element normal axis is shifted coaxial with said interferometry system;

removing and replacing the second optical assembly with said first optical assembly;

mounting said base master tool and said first optical assembly onto a traveling microscope;

bringing said reticle into focus in said traveling microscope focal plane;

removing and replacing the first optical assembly with said second optical assembly; and

adjusting said means for positioning and orienting said second backplate, wherein said plane of said optical element is brought to focus in said traveling microscope focal plane.